

CLAIMS

1. A pixel for displays comprising:

a channel layer including a channel formed by applying a first voltage, ;

5 a first signal line applying the first voltage to the channel layer;

an insulating interlayer insulating the first signal line from the channel layer and including a first contact hole and a second contact hole through which the channel layer is partially exposed;

10 a second signal line disposed on the insulating interlayer and electrically connected to the channel layer through the first contact hole;

a third signal line disposed on the insulating interlayer and electrically connected to the channel layer through the second contact hole; and

a pixel electrode disposed on the insulating interlayer and electrically connected to the third signal line.

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2. The pixel of claim 1, wherein the pixel electrode comprises indium zinc oxide.

3. The pixel of claim 1, wherein the channel layer further comprises a first region and a second region implanted with impurities at a relatively higher concentration than the channel layer, and the second and third signal lines connected to the first and second regions, respectively.

4. The pixel of claim 3, wherein the channel layer further comprises a third region and a fourth region implanted with impurities at a relatively lower concentration than the channel layer, and the third and fourth regions are disposed adjacent to the first and second regions, respectively.

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5. The pixel of claim 1, further comprising an insulating layer formed on the insulating interlayer.

5 6. A method of forming a pixel for displays, the method comprising:
forming a channel layer on a substrate using a first pattern mask;
forming a first signal line using a second pattern mask;
forming a first contact hole and a second contact hole on an insulating
interlayer using a third pattern mask, the channel layer being partially exposed
10 through the first and second contact holes, and the insulating interlayer insulating
the first signal line from the channel layer;

forming a second signal line electrically connected to the channel layer
through the first contact hole and a third signal line electrically connected to the
channel layer through the second contact hole on the insulating interlayer using a
15 fourth pattern mask; and

forming a pixel electrode electrically connected to the third signal line on the
insulating interlayer.

7. The method of claim 6, wherein the channel layer is formed by:
20 forming an amorphous silicon layer on the substrate;
converting the amorphous silicon layer into a partially crystallized layer;
and
patterning the polysilicon layer by using the first pattern mask.

25 8. The method of claim 7, further comprising irradiating a laser beam
onto the amorphous silicon layer to form a polysilicon layer.

9. The method of claim 6, prior to the forming of the first signal line, further comprising forming the insulating layer disposed on the channel layer.

10. The method of claim 9, wherein the first signal line is formed by:
5 forming a metal layer on the insulating layer;
forming an ion stopper on the metal layer corresponding to the channel layer by using the second pattern mask; and
patterning the metal layer.

10 11. The method of claim 10, after the forming of the first signal line, further comprising:

implanting impurities into the insulating layer at a first concentration;

stripping the ion stopper; and

15 implanting impurities into the insulating layer at a lower concentration than the first concentration.

12. The method of claim 6, wherein the pixel electrode is formed by depositing indium zinc oxide layer over the insulating interlayer.

20 13. A display apparatus comprising:

a first substrate including:

a first substrate;

a channel layer formed on the first transparent substrate;

25 a first signal line having a first electrode insulated from the channel layer and disposed at a position corresponding to the channel layer, the first signal line being extended in a first direction;

a second signal line having a second electrode connected to the

channel layer, the second signal line being extended in a second direction;
a third signal line having a third electrode connected to the channel
layer and insulated from the second signal line;
a pixel electrode formed over the third signal line; and
5 an etch stop layer disposed over the second signal line; and
a second substrate including a second substrate corresponding to the first
transparent substrate, and a common electrode formed on the second substrate.

10 14. The display apparatus of claim 13, wherein the first, second and third
signal lines comprise a metal, and wherein the pixel electrode and the etch stop layer
comprise indium tin oxide.

15 15. The display apparatus of claim 13, wherein the first signal line is
insulated from the second and third signal lines by an insulating interlayer, and the
insulating interlayer includes contact holes through which the second and third
signal lines electrically connected to the channel layer.

20 16. A method of manufacturing an LCD apparatus, the method
comprising:

forming a first substrate formed by:

forming a channel layer on a first substrate;

forming a first signal line having a first electrode insulated from the
channel layer and disposed at a position corresponding to the channel layer;

25 forming a second signal line having a second electrode connected to
the channel layer;

forming a third signal line having a third electrode insulated from the

second signal line and connected to the channel layer; and

forming a pixel electrode over the third signal line and an etch stop layer disposed over the second signal line; and

forming a common electrode on a second substrate corresponding to the first transparent substrate.

17. The method of claim 16, wherein the pixel electrode and the etch stop layer are formed by:

depositing an indium tin oxide layer over the first transparent substrate having the second and third signal lines; and
patterning the indium tin oxide layer.

18. The method of claim 16, after the forming of the first signal line, further comprising:

forming an insulating interlayer over the first signal line, the insulating layer having a plurality of contact holes.

19. An LCD apparatus comprising:

a first substrate including:

a first transparent substrate;

a channel layer formed on the first transparent substrate;

a first signal line having a first electrode insulated from the channel layer and disposed at a position corresponding to the channel layer;

a second electrode connected to the channel layer;

a second signal line disposed over the second electrode; and

a pixel electrode connected to the channel layer and insulated from the

second electrode; and

a second substrate corresponding to the first substrate and a common electrode formed on the second substrate and corresponding to the pixel electrode.

5 20. The LCD apparatus of claim 19, wherein the first and second signal lines comprise a metal, and wherein the second electrode and pixel electrode comprise indium tin oxide.

10 21. The LCD apparatus of claim 19, wherein the first signal line is insulated from the second signal line and the pixel electrode by an insulating interlayer, and the insulating interlayer includes contact holes through which the second signal line and the pixel electrode are electrically connected to the channel layer.

15 22. A method of manufacturing an LCD apparatus, the method comprising:

forming a first substrate formed by:

forming a channel layer on a first substrate;

20 forming a first signal line having a first electrode insulated from the channel layer and disposed at a position corresponding to the channel layer;

forming a second electrode connected to the channel layer and a pixel electrode connected to the channel layer and insulated from the second electrode; and

forming a second signal line over the second electrode; and

25 forming a common electrode corresponding to the pixel electrode on a second substrate.

23. The method of claim 22, wherein the second electrode and the pixel electrode are formed by:

forming an indium tin oxide layer over the first substrate; and

5 patterning the indium tin oxide layer to form the second electrode connected to the channel layer and the pixel electrode connected to the channel layer.

24. The method of claim 22, prior to the forming of the second electrode and the pixel electrode, further comprising forming an insulating interlayer insulating the first signal line from the channel layer and including contact holes
10 through which the first electrode and the pixel electrode are electrically connected to the channel layer.

25. An LCD apparatus comprising:

a first substrate including:

- 15 a first substrate;
- a channel layer formed on the first substrate;
- a first signal line having a first electrode insulated from the channel layer and disposed at a position corresponding to the channel layer;
- an insulating interlayer insulating the first signal line from the channel
20 layer and having a plurality of contact holes;
- a pixel electrode formed on the insulating interlayer;
- a second signal line including a second electrode connected to the channel layer;
- a third electrode connected to the channel layer and insulated from the
25 second signal line; and
- a third signal line disposed on the pixel electrode and electrically connected to the pixel electrode; and

a second substrate corresponding to the first substrate and a common electrode formed on the second substrate.

26. The LCD apparatus of claim 25, wherein the second and third signal
5 lines comprise a metal, and wherein the pixel electrode comprises indium tin oxide.

27. A method of manufacturing an LCD apparatus comprising:
forming a first substrate is formed by:

forming a channel layer on a first substrate;

10 forming a first signal line including a first electrode insulated from the
channel layer and disposed at a position corresponding to the channel layer;

forming an insulating interlayer insulating the first signal line from the
channel layer and including a plurality of openings;

forming a pixel electrode on the insulating interlayer; and

15 forming a second signal line including a second electrode connected to
the channel layer, and a third signal line including a third electrode connected
to the channel layer and the pixel electrode and insulated from the second
signal line; and

20 forming a common electrode corresponding to the pixel electrode on a second
substrate.